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09/851,313	05/09/2001	Tatsuya Usami	NEC01P069-MSb	2820

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EXAMINER	
MALDONADO, JULIO J	

ART UNIT	PAPER NUMBER
2823	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/851,313	USAMI, TATSUYA	
	Examiner	Art Unit	
	JULIO J. MALDONADO	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5,31,34,37,38,40-47,49,53 and 57-59* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 5, 31, 34, 37, 38, 40-47, 49, 53 and 57-59* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/05/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The cancellation of claims 2-4, 6-30, 32, 33, 35, 36, 39, 48, 50-52 and 54-56, and the addition of claims 57-59 as set forth in the reply filed on 07/29/2008 is acknowledged.

2. Claims 1, 5, 31, 34, 37, 38, 40-47, 49, 53 and 57-59 are pending in the application.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 5, 31, 34, 37, 38, 40-43, 45-47, 49, 53, 58 and 59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yau et al. (U.S. 6,054,379, hereinafter Yau) in view of Allada et al. (6,218,317 B1, hereinafter Allada) and the Applicants' Admitted Prior Art (hereinafter the prior art).

In reference to claims 1, 5, 40-42, 46 and 49, Yau (Fig.10H) teaches a multilayered dielectric stack (710, 714, 716) comprising a first insulation layer (710) comprising an polymeric organic material having a dielectric constant which is lower than a silicon oxide dielectric constant; a second insulation layer (714) made of a

polysiloxane compound having an Si-H group and formed and being in contact with said first insulation layer (710); a third insulation layer (716) comprising an inorganic material and formed and being in contact with said second insulation layer (714), wherien said inorganic material comprises at least one material selected from the group including silicon oxide (Yau, column 13, lines 19 – 22), and wherein said inorganic insulation layer is the uppermost layer of said multilayered dielectric stack (710, 714, 716); and a plurality of wires (724) which are formed in groves formed in said multi-layered dielectric stack (710, 714, 716) filling a space between said wires (724), wherein said second insulation layer (714) comprises a hydride organosiloxane which adheres to said first insulation layer (710) and said third insulation layer (716), said second insulation layer (714) improves adhesion between said first insulation layer (710) and said third insulation layer (716) (Yau, column 13, lines 12 – 663).

Yau fails to disclose wherein said second insulation layer comprises methylated hydrogen silsesquioxane film (MHSQ) at a thickness of about 50 nm, wherein said dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2. However, Allada (Figs.1a-1b) in a related art to the formation of copper interconnect structures teaches a second insulating film comprising a methylated hydrido organo siloxane polymer (HOSP), labeled MHSQ, wherein said polymer can be formed by spin coating processes or by conventional CVD processes (Allada, column 2, lines 7 – 67). As to the limitation that the dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least

0.2, the dielectric methylated hydrido organo siloxane polymer of Allada teaches upon the recited limitation. See the Response to Arguments section of this office action.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the insulating layer as taught by Allada in the interconnect formation structure of Yau, since this dielectric layers exhibit low dielectric constants and also have better adhesion properties than conventional dielectric layers (Allada, column 1, lines 37 – 60 and column 2, lines 36-48), and furthermore, because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness (MPEP 2144.07).

The combined teachings of Yau and Allada fail to disclose wherein said MHSQ film comprises a thickness of about 50 nm. Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir.

1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669,

149 USPQ 47 (CCPA 1966).

The combination of Yau and Allada teach wherein the first insulating layer is selected from a group including parylene, FSG, silicon oxide, or the like (Yau, column 13, lines 12 – 16) and wherein metal lines can be included on the substrate wherein said first dielectric layer covers a space between said metal lines (Yau, column 10, line 18 – column 11, line 43), but fail to disclose wherein the first insulation layer is an organopolysiloxane including methyl silsesquioxane (MSQ). However, the prior art (Instant Figs.8a-9b) teaches a device having a plurality of gate electrodes (60) having diffusion regions (54) formed on a substrate (51); and a first insulation layer (55) over said substrate (51) having a wiring connection between the gate electrodes through a diffusion region (54) locates between said gate electrodes (60), wherein said first insulation layer includes methyl silsesquioxane, and wherein said wiring connects said gate electrodes to an upper level (Instant page 2, lines 5 – 8 and page 5, lines 9 – 24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yau, Allada with the teachings of the prior art to substitute the dielectric material taught by the combination of Yau and Allada for the material disclosed by the prior art because using MSQ reduces crosstalk between metal wires (Instant page 2, lines 12 – 15) and because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness. See MPEP 2144.07.

Accordingly, the combined teachings of Yau, Allada and the prior art teach a multilayered dielectric stack including a methyl silsesquioxane layer, a methylated hydrogen silsesquioxane layer formed on an being in contact with said methyl

silsesquioxane layer and an inorganic layer formed and being in contact with said methylated hydrogen silsesquioxane layer.

Furthermore, since the methylated hydrogen silsesquioxane layer of the combination of Yau, Allada and the prior art is used as an adhesive layer, it is inherent that said methylated hydrogen silsesquioxane layer inhibits a peeling away of said inorganic insulation layer.

In reference to claim 31, the combined teachings of Yau, Allada and the prior art fail to expressly teach wherein said dielectric constant of said first insulation layer is no greater than 3.5. However, the combination of Yau, Allada and the prior art teach the same material (i.e., MSQ) used for the first insulation layer (Instant page 2, lines 5 – 8 and page 5, lines 9 – 24). Therefore, the combination of Yau, Allada and the prior art inherently teach on the claimed invention.

In reference to claims 34, 47 and 58, the combined teachings of Yau, Allada and the prior art teach wherein said first insulation layer comprises a thickness greater than a thickness of said second insulation layer; and wherein said first insulation layer can have a thickness greater than a thickness of said third insulation layer (Yau, column 13, lines 12 – 22).

In reference to claim 37, the combined teachings of Yau, Allada and the prior art teach wherein a bottom of said groove is formed on a same surface as said first insulation layer (Yau, Fig.10H).

In reference to claim 38, the combined teachings of Yau, Allada and the prior art teach wherein said plurality of wires comprises copper wires (Yau, column 13, lines 47 – 63).

In reference to claim 43, the combined teachings of Yau, Allada and the prior art teach wherein said first insulation layer, said second insulation layer and said third insulation layer of said multi-layered insulation film comprise substantially uniform widths (Yau, Fig.10H).

In reference to claim 45, the combined teachings of Yau, Allada and the prior art teach wherein said second insulation layer is formed by plasma CVD (Yau, column 4, line 19 – column 5, line 19).

In reference to claim 53, the combined teachings of Yau, Allada and the prior art teach a silicon nitride layer, said first insulation layer being formed in said silicon nitride layer and said plurality of grooves having a bottom defied by an upper surface of said silicon nitride layer (Allada, column 2, lines 7 – 57).

In reference to claim 59, the combined teachings of Yau, Allada and the prior art substantially teach all aspects of the invention but fail to expressly dislcose wherein said molar ration of II to a total of I, II and III is at least 0.5. Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose this particular molar ratio because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another

ratio (See instant specification page, 22, first paragraph, lines 6 – 7). Indeed, it has been held that mere molar ratio limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

2. Claims 1, 44 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. (U.S. 6,352,918 B1, hereinafter Huang) in view of Allada et al. (6,218,317 B1, hereinafter Allada), the Applicants' Admitted Prior Art (hereinafter the prior art) and Jeong (U.S. 5,960,317).

In reference to claim 1, Huang (Fig.2E) teaches a multi-layered insulation film (204, 208, 210) formed on a semiconductor substrate (200), said multi-layered insulation film (204, 208, 210) comprising a low dielectric constant film (204); an adhesive layer (208) formed and being in contact with said low dielectric constant film (204), wherein said adhesive layer (208) is made of an inorganic material or a material whose chemistry is between inorganic and organic; and a silicon oxide layer (210) formed on and being in contact with said adhesive layer (208), said silicon oxide layer (210) comprising an uppermost layer of said multi-layered insulation film (204, 208,

210), and a wiring structure (216) which is formed in a groove formed in said multi-layered insulation film (204, 208, 210) (Huang, column 2, line 39 – 29).

Huang fails to disclose wherein said second insulation layer comprises methylated hydrogen silsesquioxane film (MHSQ) at a thickness of about 50 nm, wherein said dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2. However, Allada (Figs.1a-1b) in a related art to the formation of copper interconnect structures teaches a second insulating film comprising a methylated hydrido organo siloxane polymer (HOSP), labeled MHSQ, wherein said polymer can be formed by spin coating processes or by conventional CVD processes (Allada, column 2, lines 7 – 67). As to the limitation that the dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2, the dielectric methylated hydrido organo siloxane polymer of Allada teaches upon the recited limitation. See the Response to Arguments section of this office action.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the insulating layer as taught by Allada in the interconnect formation structure of Huang, since this dielectric layers exhibit low dielectric constants and also have better adhesion properties than conventional dielectric layers (Allada, column 1, lines 37 – 60 and column 2, lines 36-48), and furthermore, because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness (MPEP 2144.07).

The combined teachings of Huang and Allada fail to disclose wherein said MHSQ film comprises a thickness of about 50 nm. Notwithstanding, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

The combination of Huang and Allada teach wherein the first insulating layer is selected from a group including parylene, FSG, silicon oxide, or the like (Yau, column 13, lines 12 – 16) and wherein metal lines can be included on the substrate wherein said first dielectric layer covers a space between said metal lines (Yau, column 10, line 18 – column 11, line 43), but fail to disclose wherein the first insulation layer is an organopolysiloxane including methyl silsesquioxane (MSQ). However, the prior art (Instant Figs.8a-9b) teaches a device having a plurality of gate electrodes (60) having diffusion regions (54) formed on a substrate (51); and a first insulation layer (55) over

said substrate (51) having a wiring connection between the gate electrodes through a diffusion region (54) locates between said gate electrodes (60), wherein said first insulation layer includes methyl silsesquioxane, and wherein said wiring connects said gate electrodes to an upper level (Instant page 2, lines 5 – 8 and page 5, lines 9 – 24).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Huang and Allada with the teachings of the prior art to substitute the dielectric material taught by the combination of Huang and Allada for the material disclosed by the prior art because using MSQ reduces crosstalk between metal wires (Instant page 2, lines 12 – 15) and because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness. See MPEP 2144.07.

The combined teachings of Huang, Allada and the prior art fails to expressly dislcose a plurality of wiring structures. However, this feature is seen to be obvious teach of that limitation, because the interconnection structure of Huang, Allada and the prior art would have multiple wirings as the interconnection structure is continuously showing.

Furthermore, Jeong (Figs.1A-1D) discloses a conventional interconnect structure, wherein a plurality of wires (9a, 11a) are formed in a dielectric layer (7b), wherein said dielectric layer (7b) fills a space between said plurality of wires (9a, 11a) (Jeong, column 1, lines 17 - 62).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Huang, Allada, the prior art

and Jeong to enable a plurality of interconnect structures in the combination of Huang, Allada and the prior art according to Jeong, because it is conventional in the art to provide a plurality of interconnect structures within a single semiconductor device.

Accordingly, the combined teachings of Huang, Allada the prior art and Jeong teach a multilayered dielectric stack including a methyl silsesquioxane layer, a methylated hydrogen silsesquioxane layer formed on an being in contact with said methyl silsesquioxane layer and an inorganic layer formed and being in contact with said methylated hydrogen silsesquioxane layer.

Furthermore, since the methylated hydrogen silsesquioxane layer of the combination of Huang, Allada the prior art and Jeong is used as an adhesive layer, it is inherent that said methylated hydrogen silsesquioxane layer inhibits a peeling away of said inorganic insulation layer.

In reference to claim 44, the combined teachings of Huang, Lu, Allada and the prior art teach wherein a surface of said insulation layer is substantially coplanar with a surface of said plurality of wires (Huang, Fig.2E).

In reference to claim 57, the combined teachings of Huang, Lu, Allada and the prior art teach wherein said inorganic layer has a planarized surface (Huang, column 3, lines 11 – 13). Furthermore, since the methylated hydrogen silsesquioxane layer of the combination of Huang, Allada the prior art and Jeong is used as an adhesive layer, it is inherent that said methylated hydrogen silsesquioxane layer inhibits a peeling away of said inorganic insulation layer.

Response to Arguments

3. Applicant's arguments filed 07/29/2008 have been fully considered but they are not persuasive.

Applicants argue, "…In contrast to Yau which is directed to a method of depositing an oxidized organo silane film, Allada is intended to address the problems involved with forming an undoped silicon glass (USG) hardmask on a polymer-insulated material without taking out a wafer from a spin-truck device, by producing multilayered wires in which both the hardmask and a layered insulation material are capable of being spin-coated. Further, in complete contrast to Yau and Allada, the AAPA simply teaches forming a silicon oxide film on a methyl silsesquioxane (MSQ) film 2 (Application at page 1, lines 16-21)…".

In response to this argument, as stated in the office action mailed on 04/07/2008, the claims are directed to a semiconductor device having a multilayered dielectric stack, not to a particular process of manufacture.

Furthermore, Yau teaches a wiring structure including a stack of dielectric layers, wherein said stack of dielectric layers comprise three layers: a first dielectric layer selected from FSG, parylene, silicon oxide or the like (Yau, column 13, lines 12 – 16), a second layer made of an adhesive, oxidized low-k polysiloxane compound (Yau, column 13, lines 16 - 19) and a third layer made of either silicon oxide or silicon nitride (Yau, column 13, lines 19 - 21).

Yau fails to disclose wherein said second insulation layer comprises methylated hydrogen silsesquioxane film (MHSQ) at a thickness of about 50 nm, wherein said

dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2.

However, Allada (Figs.1a-1b) in a related art to the formation of copper interconnect structures teaches a second insulating film comprising a methylated hydrido organo siloxane polymer (HOSP), labeled MHSQ, wherein said polymer can be formed by spin coating processes or by conventional CVD processes (Allada, column 2, lines 7 – 67), resulting in a dielectric layer with low dielectric constants and better adhesion properties than conventional dielectric layers (Allada, column 1, lines 37 – 60 and column 2, lines 36-48). As to the limitation that the dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2, the dielectric methylated hydrido organo siloxane polymer of Allada teaches upon the recited limitation as supported by the provided evidence, Chen et al. (Effects of slurry formulations on chemical-mechanical polishing of low dielectric constant polysiloxanes: hydrido-organo siloxane and methyl silsesquioxane).

Therefore, one of ordinary skill in the art at the time the invention was made would find obvious to combine the teachings of Yau and Allada to enable substituting the polysiloxane compound in Yau with the polysiloxane compound of Allada since these dielectric layers exhibit low dielectric constants and also have better adhesion properties than conventional dielectric layers (Allada, column 1, lines 37 – 60 and column 2, lines 36-48), and furthermore, because the selection of a known material

based on its suitability for its intended use supported a prima facie obviousness (MPEP 2144.07).

Although Yau is open to other dielectric layers than the polymeric organic material used for the first dielectric layer, Yau fails to disclose said first dielectric layer is made of MSQ. However, the prior art (Instant Figs.8a-9b) teaches a device having a first insulation layer over said substrate having a wiring connection between and wherein said first insulation layer includes methyl silsesquioxane (Instant page 2, lines 5 – 8 and page 5, lines 9 – 24) for the further advantage of reducing crosstalk between metal wires (Instant page 2, lines 12 – 15).

Since the first dielectric layer of Yau and Allada is open to materials other than the polymeric organic material layer (See page 4, second paragraph of the office action), it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Yau and Allada with the prior art to enable the dielectric material taught by Yau and Allada for the material disclosed by the prior art because using MSQ reduces crosstalk between metal wires (Instant page 2, lines 12 – 15) and because the selection of a known material based on its suitability for its intended use supported a prima facie obviousness. See MPEP 2144.07.

Accordingly, the combined teachings of Yau, Allada and the prior art teach a multilayered dielectric stack including a methyl silsesquioxane layer, a methylated hydrogen silsesquioxane layer formed on an being in contact with said methyl silsesquioxane layer and an inorganic layer formed and being in contact with said methylated hydrogen silsesquioxane layer.

Applicants further argue, "…neither Yau, nor Allada, nor the AAPA, nor any alleged combination thereof teaches or suggests "an inorganic insulation layer formed on and being in contact with said MHSQ layer and comprising a member selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride, said inorganic insulation layer comprising an uppermost layer of said multi-layered insulation film, such that said MHSQ layer inhibits a peeling away of said inorganic insulation layer", as recited in claims 1, 5, 41, 42 and 49 (Application at Figure 1). As noted above, for example, during a planarization of a surface of the inorganic insulation layer and a surface of the plurality of wires, the MHSQ layer inhibits a peeling away of the inorganic insulation layer…".

In response to this argument, as stated hereinabove, since the methylated hydrogen silsesquioxane layer of the combination of Yau, Allada and the prior art is used as an adhesive layer, it is inherent that said methylated hydrogen silsesquioxane layer inhibits a peeling away of said inorganic insulation layer.

The applicants further argue, "…the Examiner is not alleging that this feature is disclosed by Allada. Indeed, Allada simply discloses the use of methylated oxide-type materials such as hydrido-organo-siloxane polymer (HOSP) in place of undoped silicon glass (USG) as hard masks. Nowhere does Allada teach or suggest anything about the units included in HOSP. Thus, Allada clearly does not teach or suggest that the HOSP should include repeating units shown by formulae I, II and III…". In response to this argument, as stated in the previous office actions mailed on 04/07/2008, 10/30/2007, 12/15/2006, 06/09/2006, 12/29/2005, 07/11/2005, 01/26/2005, 06/15/2004, for example,

the limitation that the dielectric layer includes repeating units of $(SiCH_3O_2)_n$, $(SiO_2H)_n$ and $(SiO_3)_n$, wherein a molar ratio of $(SiO_2H)_n$ to a total of said repeating units is at least 0.2, the dielectric methylated hydrido organo siloxane polymer of Allada teaches upon the recited limitation as supported by the provided evidence, Chen et al. (Effects of slurry formulations on chemical-mechanical polishing of low dielectric constant polysiloxanes: hydrido-organo siloxane and methyl silsesquioxane).

Applicants also argue, "…Applicant would again point out that Figures 8-9 of the present Application simply depict a conventional device including an insulation layer 55 which is formed of BPSG. Nowhere in Figures 8 and 9 or anywhere else, does the AAPA teach or suggest an MHSQ layer including repeating units shown by formulae I, II, and III…".

In response to this argument, the applicants' admitted prior art was not relied upon that limitation.

Conclusion

4. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JULIO J. MALDONADO whose telephone number is (571)272-1864. The examiner can normally be reached on Mon-Fri, 8:00 A.M.-4:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571)-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew S. Smith/
Supervisory Patent Examiner, Art Unit 2823

/Julio J. Maldonado/
Art Unit 2823

/J. J. M./
Art Unit 2823